

REMARKS

Claims 1-5 are all the claims pending in the application. By this Amendment, Applicant adds claims 4 and 5. Claims 4 and 5 are clearly supported throughout the specification.

Summary of the Office Action

The Examiner has approved the Terminal Disclaimer filed on January 20, 2006. The Examiner has also withdrawn the previous grounds for rejection. The Examiner, however, found new grounds for rejecting the claims. Specifically, claims 1-3 stand rejected under 35 U.S.C. § 103(a).

Prior Art Rejections

Claims 1-3 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,434,380 to Magara et al. (hereinafter “Magara”) in view of U.S. Patent No. 5,858,479 to Saito et al. (hereinafter “Saito”) and claims 1-3 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Magara in view of JP 5-145615 to Saito et al. (hereinafter “JP Saito”). Applicant respectfully traverses these grounds for rejection in view of the following comments.

Claim 1 recites: “a quantity of supply of hard coat material by the emission of electrode material is a predetermined value determined according to a predetermined processing condition.” For example, the control unit sets a first pulse width and a first peak value so that an electric current density between the electrodes is in a predetermined range which suppresses emission of electrode material, wherein extension of an electric discharge arc column occurs during the period of the first pulse width. However, the control unit sets another pulse width and peak value (*i.e.*, the k-th pulse width and the k-th peak value) so that a quantity of supply of hard coat material by the emission of electrode material is a predetermined value determined

according to a predetermined processing condition. That is, the supply of hard coat material is the emitted electrode material and is controlled by setting pulse widths and peak values.

The Examiner contended, on page 2 of the final Office Action, that Magara teaches that emission of the electrode material is suppressed during the first pulse width because during the first pulse width as contrasted with the second pulse width less emission of the electrode occurs.

While Magara discloses a step-up current impulse diagram shown in Fig. 16(b), nowhere in the Magara patent is it taught or suggested that the pulse width and the peak value are controlled in a stepwise manner so that the quantity of supply of hard coat material by emission of electrode material is also controlled. In other words, according to the present invention, the control means sets the first pulse width and the first peak value such that the electric density between the electrodes can be in a predetermined range to suppress emission of electrode material. To this end, the increase of a diameter of the electric discharge arc column is controlled, with the result that the diameter of the electric discharge arc column is extended in the range of the first pulse width. No such control is disclosed in Magara. Saito and JP Saito do not cure the deficient teachings of Magara.

Furthermore, the Examiner acknowledges that Magara does not disclose or suggest the material of the electrode is used to coat the workpiece. The Examiner, however, alleges that Saito and JP Saito, each cure the deficient teachings of Magara. The Examiner further alleges that one of ordinary skill in the art would have been motivated to combine Magara with Saito and/or Magara with JP Saito in order to create hard coatings on the workpiece (*see* pages 3 and 4 of the Office Action). Applicant respectfully disagrees.

One of ordinary skill in the art would not have combined Magara with Saito and Magara with JP Saito and such combination would change the principle of operation of Magara. MPEP § 2143.01(VI) states that “if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.” See also *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

In the present case, Magara is concerned with the smoothness of the surface layer on a workpiece. That is, Magara focuses on forming a layer as smooth as possible on the workpiece (col. 9, lines 37 to 41). This smooth surface layer is formed of dielectric with silicon particles that are provided in the gap and not of the electrode material. In other word, Magara uses dielectric with silicon particles to purposefully prevent the electrode material from sticking to the workpiece. In short, Magara’s disclosure explicitly indicates that it is undesirable for the electrode material to stick to the workpiece.

Specifically, Magara recites: “[h]owever, electrode material sticking to the workpiece is prevented by using the silicon particles....[d]isposing the silicon particles in such a manner ensures that almost all of the particles adhered to or absorbed into the workpiece are silicon particles rather than electrode material” (col. 5, lines 24-31). In short, the hard coat material is not formed by the emission of electrode material. On the contrary, in Magara, the electrode material is purposefully prevented from sticking to the workpiece.

The Examiner alleges that Saito and JP Saito cure the deficient teachings of Magara. Saito discloses using TiH₂ as an electrode material and forming a hard surface on the workpiece using this TiH₂ electrode. Moreover, Saito discloses that in comparison to the TiO₂ electrode,

the surface roughness of the workpiece is increased with the TiH_2 electrode (col. 5, lines 11 to 64).

Saito, however, explicitly contradicts the disclosure of Magara. Magara is concerned with preventing the electrode material from sticking to surface to obtain the desired smoothness, whereas Saito is concerned with strong adhesion of titanium and as such discloses using a TiH_2 electrode (col. 4, lines 34 to 39 and lines 41 to 56). Accordingly, if Magara's disclosure is modified to exclude preventing the electrode material from sticking to the workpiece and using the TiH_2 electrode as opposed to silicon particles, clearly this changes the principle of operation of the Magara invention. Moreover, the proposed modification may render Magara unsatisfactory for its intended purpose. That is, although a hard surface may be formed using TiH_2 electrode of Saito, the surface smoothness would be substantially decreased. And of course it would also be impossible to coat the workpiece with the desired dielectric layer if Magara is modified in the manner which the Examiner suggests

Similarly, JP Saito explicitly contradicts the disclosure of Magara. JP Saito is concerned with forming a firm cover layer of sufficient thickness on the workpiece (¶ 7 of machine translation). Accordingly, in one example, JP Saito discloses using an electrode material for the cover layer of the workpiece (¶ 18). However, if Magara's disclosure is modified to exclude preventing the electrode from sticking to the workpiece and using the WC-Co electrode, as opposed to silicon particles, clearly this changes the principle of operation of Magara. That is, by modifying the disclosure of Magara to use the WC-Co electrode, as opposed to preventing the electrode material from sticking and using silicon particles for the coating, the surface

smoothness of the workpiece would be deteriorated and the desired dielectric layer of Magara cannot be formed.

In short, the suggested combination of references would require a substantial reconstruction and redesign of the elements shown in Magara as well as changes in the basic principle under which the Magara construction was designed to operate and its desired end result (*i.e.*, preventing the electrode material from sticking to the workpiece and using the working fluid's suspension of silicon particles to form a dielectric coating). It could not have been "obvious" to cast aside all of Magara's fundamental teachings in this manner. Therefore, one of ordinary skill in the art, but for the present invention, would not have combined Magara and Saito and Magara and JP Saito. For at least these exemplary reasons, claim 1 is patentable over the combined disclosure of Magara in view of Saito and over Magara in view of JP Saito.

Claims 2 and 3 recite features similar to those described above with respect to claim 1. Accordingly, claims 2 and 3 are not obvious in view of the combined teachings of Magara and Saito and Magara and JP Saito, based on a rationale analogous to that set forth above for claim 1.

New Claims

In order to provide more varied protection, Applicant adds claims 4 and 5. Claims 4 and 5 are patentable at least by virtue of their dependency on claim 1.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly invited to contact the undersigned attorney at the telephone number listed below.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appl. No. 09/937,220
Attorney Docket No.: Q65416

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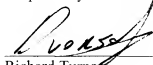
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23373

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